Computational Modeling of Laser-Tissue Interaction*

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Abstract
Computational modeling can play an important role both in designing laser-tissue interaction experiments and in understanding the fundamental mechanisms underlying such interactions. In turn, this can lead to more rapid and less expensive development of new procedures and instruments, and in a better understanding of their operation. At Lawrence Livermore National Laboratory, we have recently directed some of the experience gathered over many years in modeling laser-matter interactions for fusion research towards the laser-tissue interaction problem. A computer program called LATIS is being been developed to treat specific properties of laser-tissue interaction such as highly scattering light transport, thermal damage and coagulation, and effects of material strength on material movement. The structure and contents of LATIS are described in this talk. Examples of computational simulations for several problems such as thermal coagulation, tissue welding, and soft and hard-tissue ablation are presented. The role of the simulations in instrument development is described and future development plans are given.

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